CLAIMS

I claim:

1. A friction material with improved wear resistance and thermal conductivity, comprising:

a functionally graded material including a composite material having heat and wear resistant fibers therein impregnated with a resin; and

a plurality of heat conducting elements situated within said functionally graded material in an orientation wherein said heat conducting elements transfer heat away from one surface of said functionally graded material to another surface.

2. A friction material as set forth in claim 1, wherein said plurality of heat conducting elements comprise members selected from the group consisting of filaments, threads, wires, powders, and particulate, said heat conducting elements being disposed in said functionally graded material in a predetermined arrangement.

3. A friction material as set forth in claim 1, wherein said plurality of heat conducting elements are positioned substantially normal to a friction surface of said functionally graded material.

4. A friction material as set forth in claim 1, wherein said heat and wear resistant fibers comprise aramid fibers.

5. A friction material as set forth in claim 4, wherein said aramid fibers comprise Kevlar fibers.

6. A friction material as set forth in claim 2, wherein said plurality of heat conducting elements comprise members selected from the group consisting of metal, metal alloy, copper, copper alloy, and graphite compositions.

7. A friction material as set forth in claim 1, wherein said fibers comprise members selected from the group consisting of minerals, glass, asbestos, cotton, polyester, graphite, carbon, pyrolytic carbon, aramid, synthetic, and polymer fibers.

8. A friction material as set forth in claim 1, ~~wherein said heat conducting~~ elements comprise a varying concentration from a first surface to a second surface.

9. A friction material as set forth in claim 1, wherein said friction material comprises a clutch facing material.

10. A friction material as set forth in claim 1, wherein said friction material comprises a brake lining material.

11. In a friction material having opposed surfaces with one surface engaging a movable, engageable part, the improvement comprising heat conducting elements disposed in said friction material in a selected arrangement for transferring heat away from said engaging surface.

12. The friction material according to claim 11, wherein said heat conducting elements comprise a plurality of metal components disposed within said friction material.

13. The friction material according to claim 12, wherein said plurality of metal components comprise members selected from the group consisting of filaments, threads, wires, powders, and particulate.

14. The friction material according to claim 13, wherein said plurality of metal components comprise members selected from the group consisting of copper components and copper alloy components.

15. The friction material according to claim 12, wherein said metal components are oriented substantially perpendicular to said engaging surface.

16. In a method for making a functionally graded friction material having improved wear resistance and thermal conductivity, the improvement comprises the step of positioning a plurality of heat conducting elements in an arrangement having a varying concentration, said heat conducting elements being constructed to transfer heat away from a surface constructed to engage a moveable part to an opposite surface for heat dissipation.

17. The method as recited in claim 16, wherein the positioning step comprises the step of inserting the heat conducting elements into a thickener for the functionally graded friction material prior to the thickener hardening.

18. The method as recited in claim 17, wherein the positioning step comprises the step of laying a plurality of heat conducting elements through the thickener.

19. The method as recited in claim 17, wherein the positioning step comprises the step of weaving the heat conducting elements with a plurality of fibers to form the functionally graded friction material prior to impregnating with a resin.

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